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Grass Thrips in Perennial Grasses Grown for Seed

A Management Guide for a Pest with Extremely High Potential for Developing Insecticide Resistance

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Scott Schell
University of Wyoming Extension Entomology Specialist
Gary White
CCA-RM Allied Seed, LLC (Ret.), Xtra Hand LLC

Grass thrips (*Anaphothrips obscurus*) are a widespread pest of both annual and perennial grass crops. These yellow-colored insects are slightly less than one-twentieth of an inch long as adults. Grass thrips (GT) can be found living in perennial grass fields all year long and are able to withstand temperatures far below freezing unharmed.

GT are all females and reproduce asexually, giving them a high rate of reproduction. If a genetic mutation occurs in a GT that provides resistance to an insecticide's mode of action, it can rapidly become predominant in a population.

W. R. Kneebone's (1957) publication on blue grama seed production research conducted at the USDA Southern Great Plains Field Station in Woodward, Oklahoma, covered all aspects of the crop's management. The research included GT insecticide efficacy trials conducted from 1953–1955. Only dieldrin insecticide treatments provided significant increases in grama seed production and quality. This observed yield increase was attributed to excellent GT control with that insecticide.

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A blue grama (*Bouteloua gracilis*) seed head with blossoms. Grass thrips feeding on and the insertion of their eggs into the developing seed head tissue has been shown to greatly reduce the yield and viability of the seeds of many grass species.

Kneebone's study demonstrated that GT management, along with ideal irrigation and nitrogen fertilization, are important for maximizing blue grama seed yield. Other researchers have documented that GT feeding and egg laying in developing seed heads sometimes severely reduces yields in many other species of cool and warm season grasses.

Life History of Grass Thrips

GT have both a rapid rate of reproduction and development, going from egg to adult in as little as 12 days in ideal conditions (Hinds, 1900). Early in the growing season, many GT are winged and mobile while later generations are primarily flightless and more prolific.

Two immature stages of GT, the prepupa and pupa, leave the host plant and do not feed (Fig 1). This has important implications for management in that a single treatment of a short-acting insecticide will miss the thrips in those stages and they will return to the plants as adults. In addition, the GT eggs that were inserted into plant tissue before the treatment will not be killed.

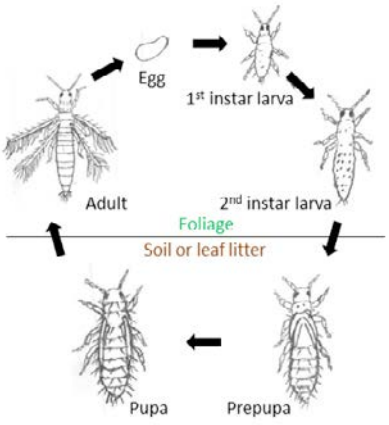

Figure 1. The GT lifecycle has six stages of development. The prepupa stage leaves the host plant before eventually returning as an adult. Adult GT preferentially feed on and insert their eggs into seed head tissue, causing both physical as well as feeding injury (Shimat Joseph, Univ. of Georgia Illustration).

Sampling Grass Seed Fields for Grass Thrips

GT are present in perennial grass fields throughout the year, but the most important time to sample for them can be based on the grass plant's development. In the Bighorn Basin, it is the flag leaf to ripe seed stage.

In the Oregon State University *Pocket Guide to Grass Seed Pests and Beneficials: Identification, Monitoring, Management* (2021) surveying at the earlier shoot elongation to second node stage is recommended for the milder climate of western Oregon. The authors also state a threshold of 10 GT per grass head will probably result in "silver top" plant damage. However, this is not an exact economic injury or action threshold of all GT populations.

GT population levels that cause economic damage need to be determined for each grass species' seed crop. To determine economic injury levels, the cost of control, the efficacy of that control, and the resulting protection of yield and quality must be determined.

Sampling for adult GT with functional wings can be performed with a heavy-duty sweep net. Sweep net sampling is also the best way to monitor the populations of other aboveground pest insects in grass seed fields. However, gentle sweep netting may miss the part of the GT population that cannot fly. Swat the crop foliage aggressively to dislodge as many of the pests as possible.

In addition to sweep net sampling, shaking/beating randomly selected stems from the field within a white plastic "beat" cup to dislodge GT is recommended. Reiseg et al (2010) describe the beat cup method as follows: "…an individual tiller was rapped 10 times on the inside of a 9.5x11-cm type 2 high density polyethylene cup. When tillers were larger than the cup height, they were folded at the stem to fit within the cup."

Using both sweep nets and beat cups is recommended until a preferred sampling method for measuring GT populations, pre and post treatment, is determined. It

is reasonable to expect that insecticide treatments for GT will also reduce populations of other grass seed pests, such as the meadow plant bug. Examine your sweep net catches for these other pest insect species too.

After an insecticide treatment for GT, re-sample after the chosen product's re-entry interval has expired. The efficacy of the treatment should be evaluated and the field monitored for the GT that were in the egg, prepupa, and pupal stages repopulating the grass. A second insecticide treatment will probably be necessary to protect the developing grass seed from GT feeding and egg-laying in the tissue of the seed head.

*Caution: Plant pest mites can flare up after some types of insecticide treatments that are ineffective against them but suppress their predators. Monitor for Banks grass mites after the first and second treatment of GT insecticide. If the field begins to look off color, grayish, or chlorotic, closely examine the grass to determine if mites are the cause and treat accordingly. No population thresholds for pest mites have been established for grasses grown for seed. Bifenthrin-based insecticides are labeled for mites in grass seed and provide control. Alternatively, consider using a mite-specific pesticide labeled for the crop.

Grass Thrips Management

Cultural Control: Completely burning dormant grass seed field can reduce overwintering populations of grass thrips, but it is unknown if that would achieve sufficient mortality to protect the crop the next growing season. In 1900, when burning fields was the only option, D. W. Hinds found that it was difficult to achieve sufficient mortality of the GT. However, his field work was conducted in a much more humid climate than that of Wyoming. Uneven or non-uniform burns do not provide adequate GT control.

Chemical Control: A non-comprehensive list of insecticides currently labeled for grass thrips can be found in S. E. Salisbury and N. P. Anderson's chapter on grass seed pests in the *2022 Pacific Northwest Pest Management Handbook for Insects.* Visit https://pnwhandbooks.org/insect/legume-grass-field-seed/grass-seed/grass-seed-thrips to view the list. (Used with permission.)

Bifenthrin: (Brigade 2EC and WSB) at 0.1 lb ai/A. Apply in spring and fall when insects are present at their economic threshold level. Maximum amount allowed is 0.2 lb ai/A per season. Applications must be made no less than 14 days apart. PHI 30 days prior to harvest for forage, hay, and seed. **Has specific labeling for mite control in grass seed crops.*

Carbaryl: (Sevin and generics) at 1 to 1.5 lb ai/A. PHI 14 days. REI 12 hr. Up to two applications per year but not less than 14 days apart. Do not exceed 3 lb ai/A per season. Use high pressure to improve spray penetration into boot. **Carbaryl has notoriously low efficacy on mites.*

Cyfluthrin: (Baythroid XL and generics) at 0.02 to 0.022 lb ai/A. PHI 0 days. REI 12 hr. Maximum amount allowed per 5-day interval is 0.022 lb ai/A. Maximum amount allowed per crop season is 0.089 lb ai/A.

Dimethoate: at 0.25 to 0.33 lb ai/A. PHI 14 days. Do not graze or feed hay, forage, or seed, or use screenings from treated fields. Seed conditioners must be informed if seed is from a treated field.

Lambda-cyhalothrin: (Warrior and generics) at 0.02 to 0.03 lb ai/A. PHI 0 days for grazing and cut for forage; 7 days for straw and seed crop. REI 24 hr. **Listed as giving mite "suppression."*

Lambda-cyhalothrin/chlorantraniliprole: (Besiege) at 6.0 to 10.0 fl oz/A. PHI 0 days for grazing and cut for forage; 7 days for straw and seed crop. REI 24 hr. Do not exceed a total of 27.0 fl oz of Besiege or 0.09 lb ai of lambda-cyhalothrin-containing products or 0.2 lb ai of chlorantraniliprole-containing products per acre per year. **Has specific labeling for mite control in grass seed crops.*

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Editor: Brooke Ortel
Designer: Jeremy Cain

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